**Plant diversity patterns and conservation implications under climate-change scenarios in the Mediterranean**

Diversity

Supplementary tables and figures

**Supplementary tables**

**Table S2.** Median range contraction values for every Global Circulation Models (GCMs) and Representative Concentration Pathways (RCPs) included in the analyses.

|  |  |
| --- | --- |
| GCM/RCP | Median |
| BCC 2.6 | 96.7 |
| BCC 8.5 | 100.0 |
| CCSM4 2.6 | 68.1 |
| CCSM4 8.5 | 100.0 |
| HadGEM2 2.6 | 94.4 |
| HadGEM2 8.5 | 100.0 |

**Table S3.** Median range contraction values for every plant family included in the analyses.

|  |  |  |  |
| --- | --- | --- | --- |
| **Family** | **Median** | **Family** | **Median** |
| Alliaceae | 98.2 | Hyacinthaceae | 100.0 |
| Apiaceae | 94.5 | Hypericaceae | 85.1 |
| Araceae | 84.4 | Iridaceae | 83.8 |
| Asclepiadaceae | 89.7 | Lamiaceae | 91.6 |
| Aspleniaceae | 97.4 | Liliaceae | 97.6 |
| Asteraceae | 93.6 | Orchidaceae | 84.1 |
| Boraginaceae | 93.0 | Plumbaginaceae | 98.7 |
| Brassicaceae | 94.1 | Poaceae | 87.9 |
| Campanulaceae | 91.1 | Polygonaceae | 73.3 |
| Caryophyllaceae | 93.5 | Primulaceae | 75.8 |
| Cistaceae | 99.9 | Ranunculaceae | 99.0 |
| Colchicaceae | 77.5 | Rosaceae | 93.1 |
| Convolvulaceae | 70.7 | Rubiaceae | 82.1 |
| Cuscutaceae | 78.8 | Santalaceae | 98.8 |
| Cyperaceae | 80.7 | Scrophulariaceae | 77.6 |
| Dipsacaceae | 95.6 | Ulmaceae | 76.5 |
| Euphorbiaceae | 94.4 | Valerianaceae | 98.9 |
| Fabaceae | 97.7 | Veronicaceae | 84.7 |
| Fumariaceae | 76.6 | Violaceae | 97.6 |

**Table S4.** The eleven single island endemic plant taxa of Crete that should be prioritized in terms of conservation effort based on the EDGE index**.**

|  |  |  |
| --- | --- | --- |
| **Family** | **Taxon** | **EDGE** |
| Aspleniaceae | *Asplenium creticum* | 8.74 |
| Fumariaceae | *Corydalis uniflora* | 7.55 |
| Primulaceae | *Cyclamen confusum* | 7.52 |
| Ulmaceae | *Zelkova abelicea* | 7.44 |
| Rosaceae | *Cotoneaster creticus* | 7.42 |
| Rosaceae | *Sanguisorba cretica* | 7.42 |
| Euphorbiaceae | *Andrachne telephiodes* subsp. *oreocretensis* | 7.38 |
| Colchicaceae | *Colchicum cretense* | 7.35 |
| Araceae | *Arum idaeum* | 7.34 |
| Polygonaceae | *Polygonum idaeum* | 7.11 |
| Cuscutaceae | *Cuscuta atrans* | 7.02 |

**Table S5.** Median altitude and pH for sites having higher or lower than expected phylogenetic alpha diversity (PD) as well as for the not-significant sites. NS: not-significant. Over: sites with higher than expected PD. Under: sites with lower than expected PD.

|  |  |  |
| --- | --- | --- |
| Type | Altitude (m a.s.l.) | pH |
| Over | 985 | 7.06 |
| Under | 865 | 7.05 |
| NS | 446 | 7.12 |

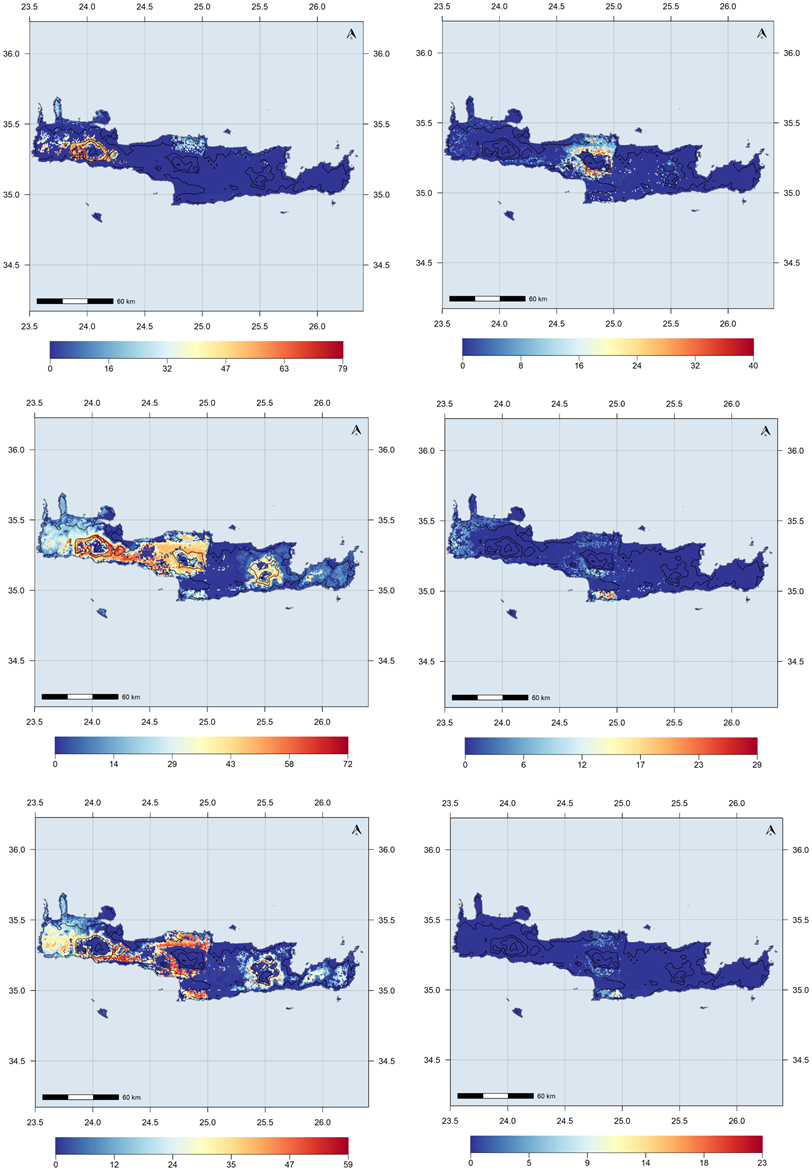
**Table S6.** Extent (km2), species richness (SR) and the standardized effect scores of phylogenetic alpha diversity (SESPD) of the areas identified as climatic refugia in Crete for the present and every Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combination. A: Western. B: West (wider area of Lefka Ori). C: Asterousia (located in south-central Crete). D: East-Central. E: East. F: Eastern. The climatic refugia are depicted in Figure 6.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| GCM/RCP | Variable | A | B | C | D | E | F |
| Present | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 8 | 121 | 4 | 82 | 46 | 8 |
| SESPD | -1.80 | 1.02 | -1.05 | 2.07 | 0.39 | -1.80 |
| BCC 2.6 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 3 | 109 | 4 | 21 | 8 | 3 |
| SESPD | 0.75 | -0.77 | 0.64 | -0.02 | 1.52 | 0.75 |
| BCC 8.5 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 1 | 5 | 1 | 19 | 1 | 1 |
| SESPD | 0 | 0.98 | 0 | -0.76 | 0 | 0 |
| CCSM4 2.6 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 12 | 119 | 11 | 70 | 51 | 12 |
| SESPD | -1.82 | -1.00 | -2.31 | -0.95 | -0.22 | -1.82 |
| CCSM4 8.5 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 1 | 7 | 1 | 6 | 1 | 1 |
| SESPD | 0 | -0.64 | 0 | -0.22 | 0 | 0 |
| HadGEM2 2.6 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 23 | 82 | 14 | 55 | 38 | 23 |
| SESPD | -0.71 | -1.07 | -1.61 | -1.56 | -0.78 | -0.71 |
| HadGEM2 8.5 | Area | 31.6 | 189.2 | 2.1 | 167.8 | 54.8 | 31.6 |
| SR | 1 | 1 | 1 | 1 | 1 | 1 |
| SESPD | 0 | 0 | 0 | 0 | 0 | 0 |

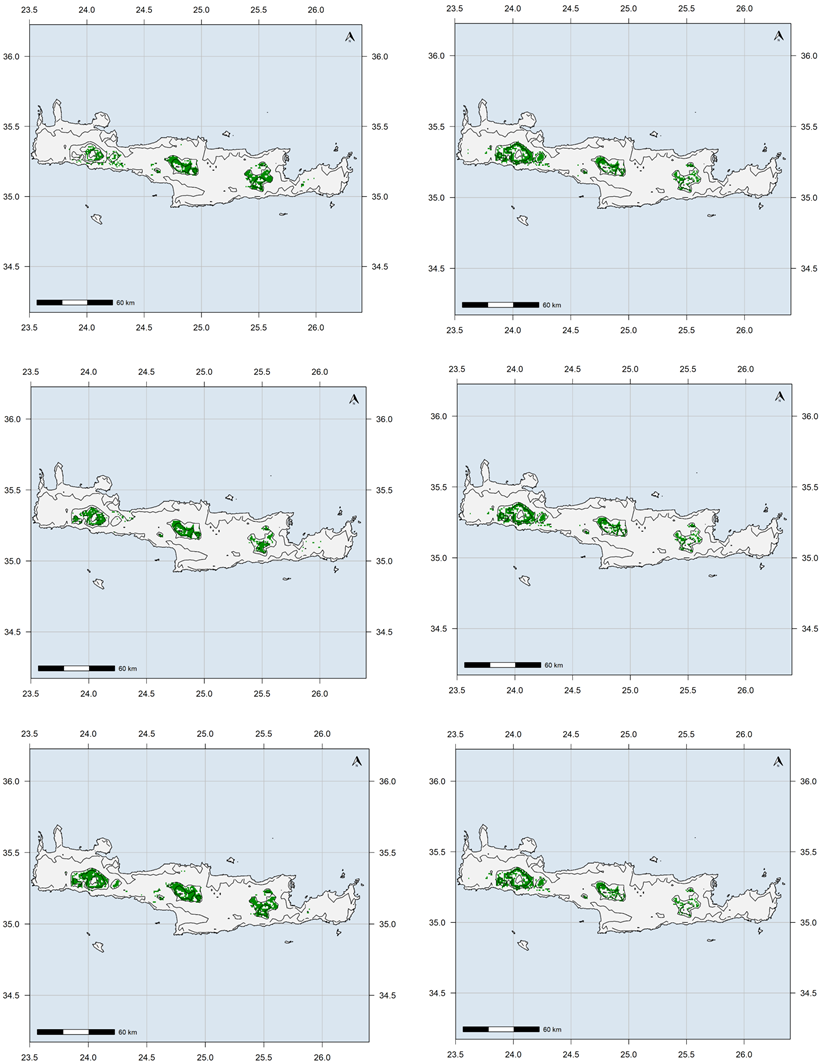
**Table S7.** Percent overlap (%) between the protected areas (PA) network and the climatic refugia (CR) recognised in Crete. The extent (in km2) of each climatic refugium is also presented.

|  |  |  |
| --- | --- | --- |
| Climatic refugium | Extent | Percent overlap (%) |
| Western | 39.2 | 35.70 |
| West | 189.2 | 97.00 |
| Asterousia | 2.1 | 33.33 |
| East-Central | 167.8 | 69.90 |
| East | 54.8 | 48.70 |
| Eastern | 39.2 | 35.70 |

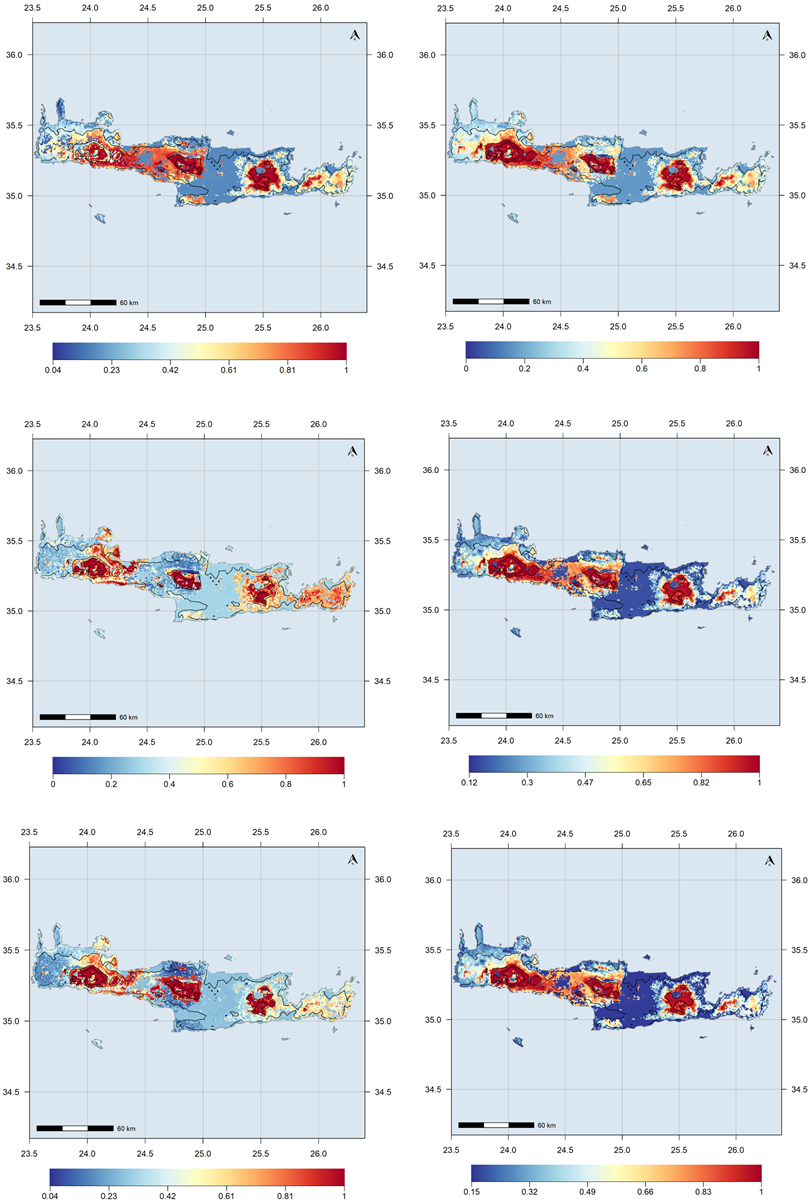
**Supplementary Figures**

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**Figure S1.** SIE richness map for the Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combination: (a) BCC 2.6, (b) BCC 8.5, (c) CCSM4 2.6, (d) CCSM4 8.5, (e) HadGEM2 2.6 and (f) HadGEM2 8.5. The black lines denote the altitudinal contours starting from 500 m a.s.l.

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**Figure S2.** Absolute difference between current and future SIE hotspots for the Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combination: (a) BCC 2.6, (b) BCC 8.5, (c) CCSM4 2.6, (d) CCSM4 8.5, (e) HadGEM2 2.6 and (f) HadGEM2 8.5. Green color indicates areas with statistically significant absolute differences between current and future hotspots.



**Figure S3.** Relative difference between current and future SIE hotspots for the Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combination: (a) BCC 2.6, (b) BCC 8.5, (c) CCSM4 2.6, (d) CCSM4 8.5, (e) HadGEM2 2.6 and (f) HadGEM2 8.5.



**C**

**B**

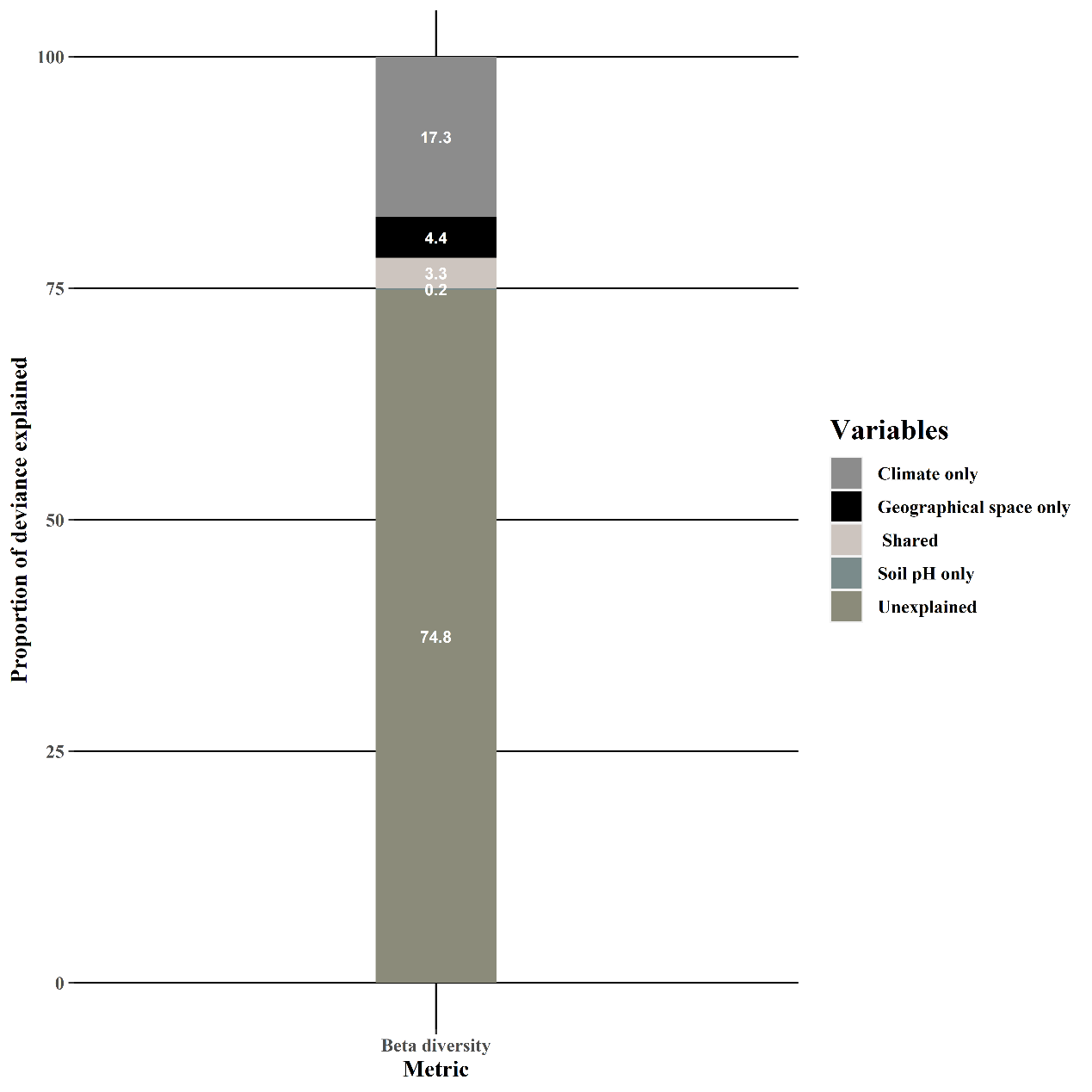
**A**

**D**

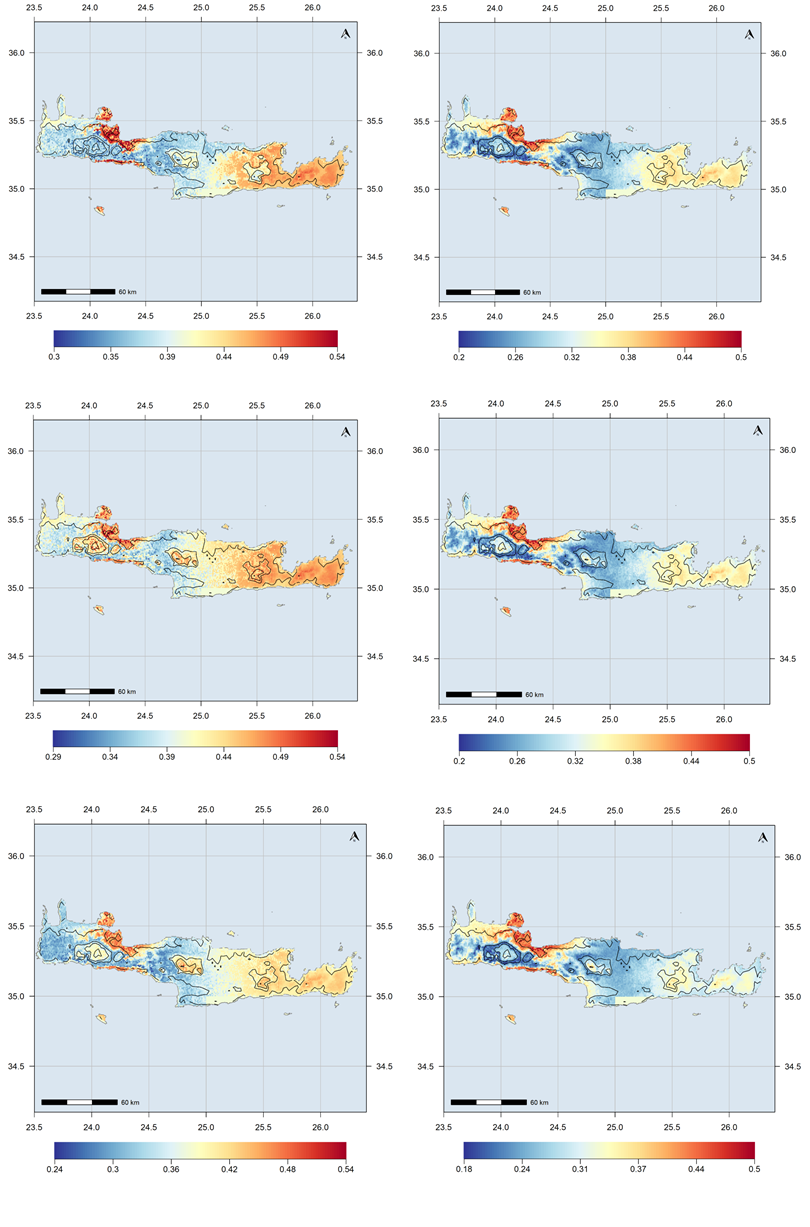
**E**

**F**

**Figure S4.**Proportion of species predicted to become extinct under (A) BCC 2.6, (B) BCC 8.5, (C) CCSM4 2.6, (D) CCSM4 8.5, (E) HadGEM2 2.6 and (F) HadGEM2 8.5 Global Circulation Model and Representative Concentration Pathway.



**Figure S5.** The proportion of total deviance explained attributable purely to climate (grey), purely to geography (black) and purely to soil pH (olive green).



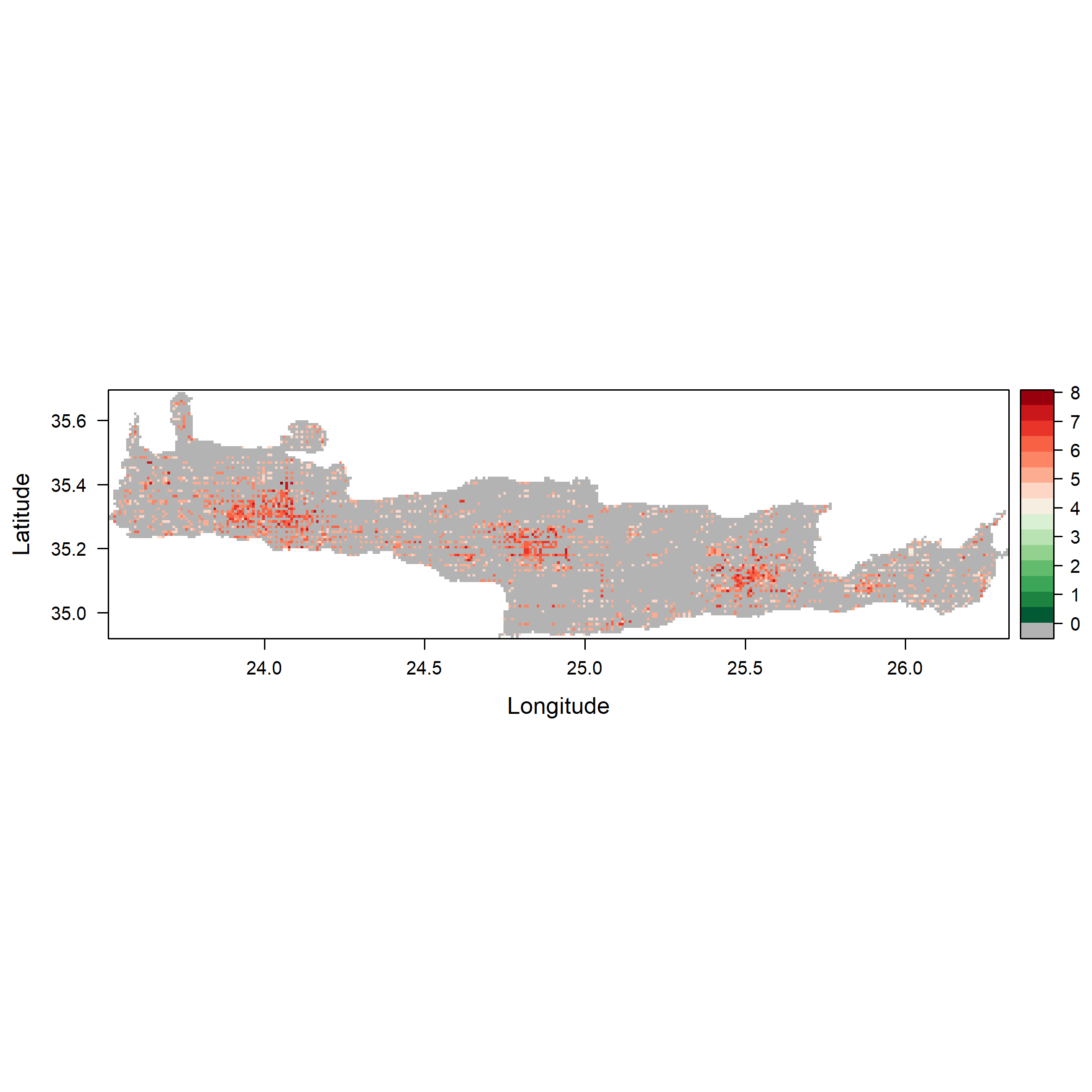
**Figure S6.** Species turnover as calculated through the GDM framework for the SIE assemblages between the current time-period and the Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combination: (a) BCC 2.6, (b) BCC 8.5, (c) CCSM4 2.6, (d) CCSM4 8.5, (e) HadGEM2 2.6 and (f) HadGEM2 8.5.



**Figure S7.** Sites with significantly higher or lower than expected phylogenetic diversity (blue and red shades, respectively).



**A**



**B**

**Figure S8.** Map of Crete showing SIE assemblages with their respective EDGE index.(A) The EDGE scores are based upon the phylogenetic tree that was built under the framework outlined in [52-53]. (B) The EDGE scores are based upon the phylogenetic tree that was built under the framework outlined in [51].



**B**

**C**

**D**

**A**

**E**

**F**

**Figure S9.** Map of Crete showing predicted SIE assemblages with their respective ΔEDGE index, for the (A) BCC 2.6, (B) BCC 8.5, (C) CCSM4 2.6, (D) CCSM4 8.5, (E) HadGEM2 2.6 & (F) HadGEM2 8.5 GCM/RCP combination. Red and green areas indicate extinction hotspots and coldspots, respectively.



**Figure S10.** Mean irreplaceability index for the protected areas network (Natura 2000 sites) and climatic refugia in Crete, for the current and all the Global Circulation Model (GCM) and Representative Concentration Pathway (RCP) combinations considered in our study. The vertical dashed line represents the median irreplaceability index.